

## Acute Limb Ischemia Associated with COVID-19

M. Abdelbaki \*

Laghouat mixed hospital, Amer telidji Laghouat university (ALGERIA).

**\*Corresponding Author:** M. Abdelbaki, Laghouat mixed hospital, Amer telidji Laghouat university (ALGERIA).

**Received Date:** October 13, 2023; **Accepted Date:** October 24, 2023; **Published Date:** November 20, 2023

**Citation:** M. Abdelbaki, (2023), Acute limb ischemia associated with COVID-19, *J. Clinical Cardiology and Cardiovascular Interventions*, 6(8); DOI:10.31579/2641-0419/343

**Copyright:** © 2023, M. Abdelbaki. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Abstract

Coronavirus disease-19 (COVID-19) caused by SARS-CoV-2 first appeared in December 2019 in China (1) and has remained a hot topic for the past 3 years. Currently, it is considered a multi-systemic disease associating a hypercoagulable state responsible for thrombotic complications in seriously affected patients. Acute COVID-19 infection causing micro thrombi called immune thrombi.

Among the complications, acute limb ischemia is rarer than coronary heart disease, which explains the absence of clear and consensual guidelines allowing cardiologists to diagnose and treat acute limb ischemia in the context of the Covid 19 pandemic.

**Keywords:** Covid-19 ; acute ischemia ; hypercoagulability ; severe respiratory syndrome, unfractionated heparin

### Introduction

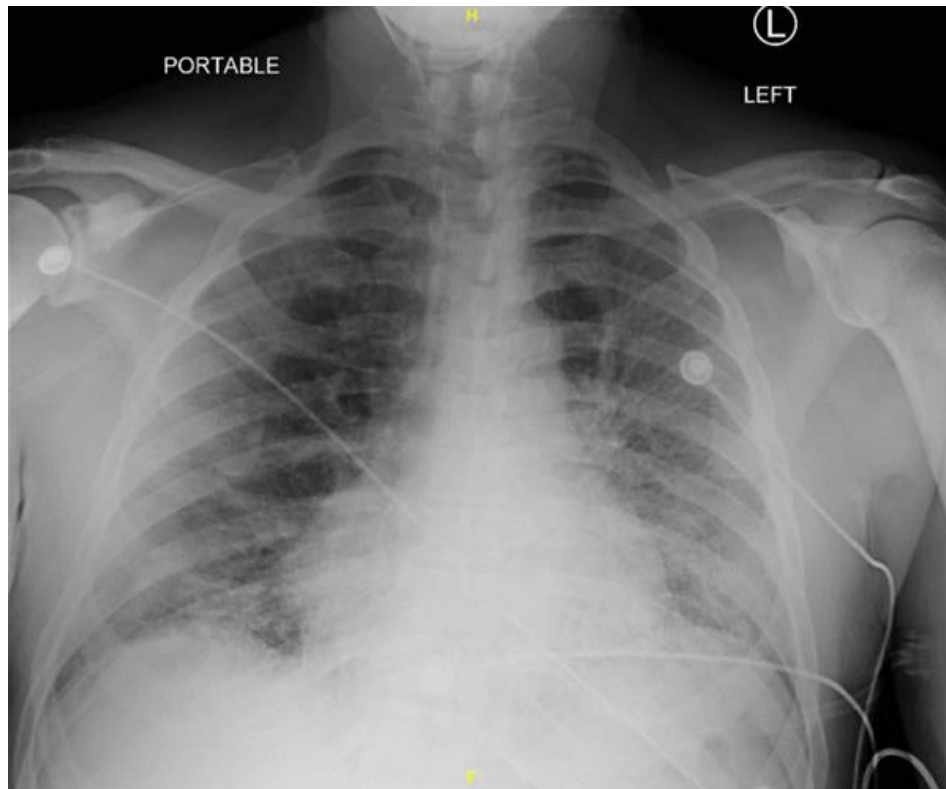
A 60-year-old man suffering from hypertension, hyperlipidemia, a history of smoking and chronic obstructive pulmonary disease (COPD) presented to our hospital with a febrile state for a week associated with respiratory distress syndrome (dyspnea) which gradually got worse. He had a productive cough and severe pain in his right leg since 6 p.m.

The clinical and paraclinical constants are as follows, tachypnea (48 parmin cycles), tachycardia (FC123bpm), blood pressure 140/90 mmhg and hyperpyrexia (39.2°).

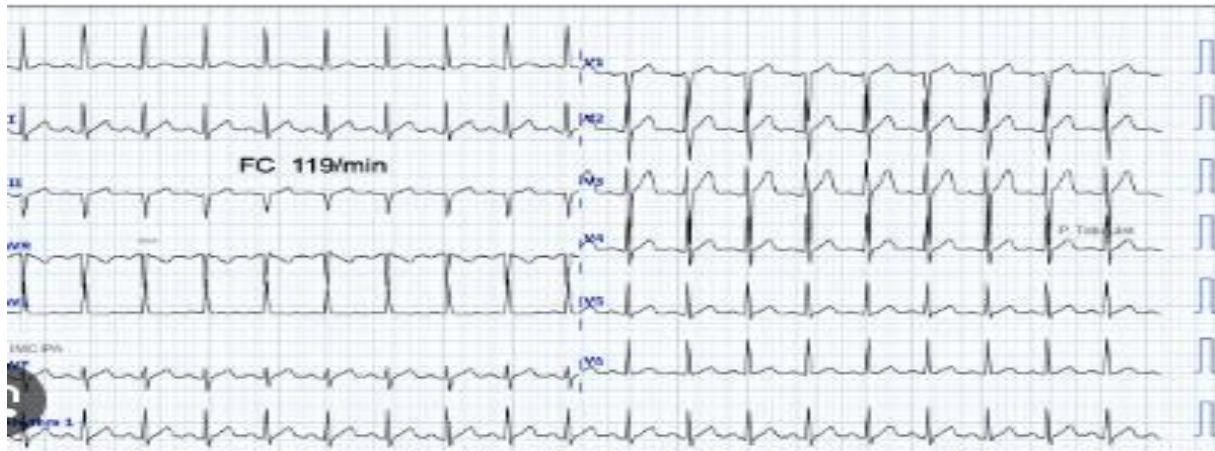
Examination of the lower limbs showed a decrease in sensitivity of the right foot, The abolition of the posterior tibial and right dorsal pedal pulses. The distal toes were cyanotic and cold.

Laboratory results found a positive PCR for COVID-19, an elevated D-dimer level (8300ng per ml), a positive CRP and an elevated fibrinogen level.

Oxygen saturation was 80% without oxygen (in the open air).



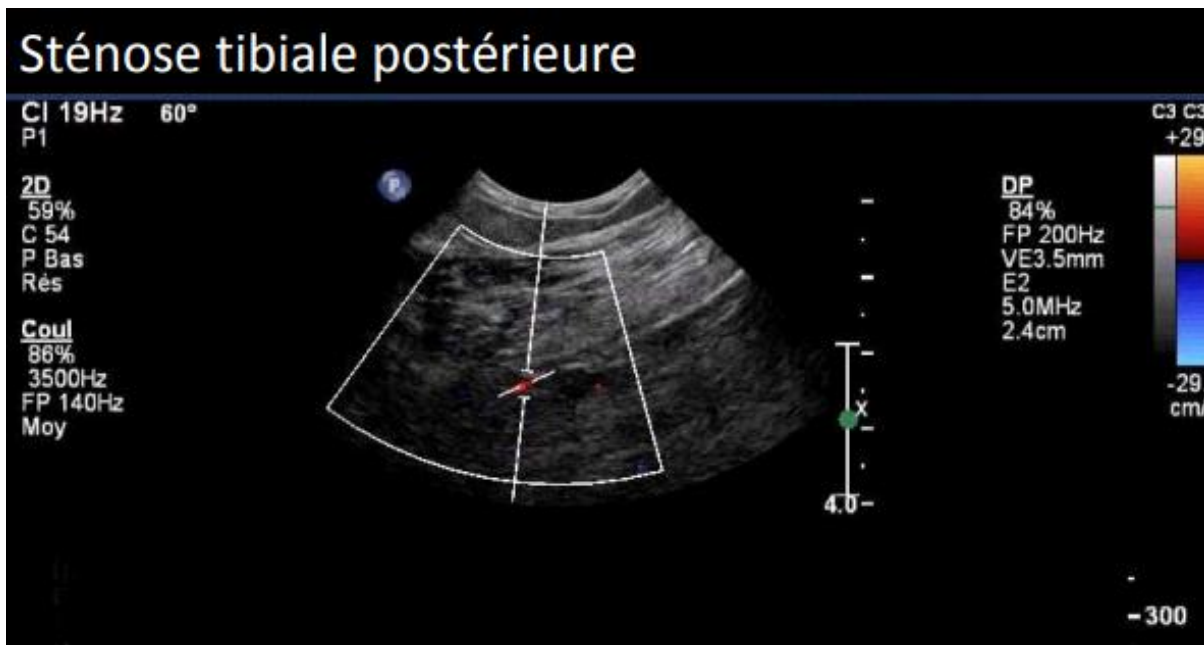
**Figure 1:** Front chest x-ray on admission showing pulmonary condensation syndrome. Results compatible with viral pneumonia.



ECG registers in sinus rhythm with tachycardia

**Doppler echocardiogram:** finds good LV function with an EF of 65% and good global and segmental contractility. We performed an **arteriovenous Doppler ultrasound** of the lower limbs and found a thrombus in the distal

right popliteal artery, minimal flow in the distal posterior tibial artery. There was no clear sign of collateral flow or sign of thrombus in deep veins



In addition to antibiotic and corticosteroid treatment, he was treated with an IV infusion of unfractionated heparin (UFH) with a target control of  $1.5 \times -3 \times \text{TCA}$ .

Unfortunately on day 2 of his hospitalization his condition worsened with severe saturation where he was discharged, intubated and ventilated.

On day 6 of his hospitalization, the patient died of fatal septic shock.

### Discussion :

Thrombotic complications (3) of COVID-19 are thought to be due to a hyperinflammatory response caused by the virus. Several complications have been described in the literature. These include acute limb ischemia, abdominal and thoracic aortic thrombosis, mesenteric ischemia, myocardial infarction, venous thromboembolism, acute stroke, and disseminated intravascular coagulation.

-Pathophysiology: SARS-CoV-2 is a single-stranded RNA virus that belongs to the Coronaviridae family, which it shares with severe acute respiratory

syndrome coronavirus 1 (SARS-CoV-1) and respiratory syndrome coronavirus from the Middle East (MERS-CoV) [ 3,4]. SARS-CoV-1, MERS, and SARS-CoV-2 all bind to angiotensin-converting enzyme 2 (ACE-2), which is a crucial counter-regulatory enzyme that converts angiotensin I to angiotensin II [5, 6]. ACE-2 is present in almost all human tissues, Angiotensin I, when not broken down by ACE-2, promotes an inflammatory state in the body and causes vasoconstriction, sodium retention and fibrosis throughout the body [ [7,8,9] ]. Recent studies have evaluated the role of inflammation in creating hypercoagulable states, possibly via activation of endothelial cells, platelets and leukocytes inducing tissue factor (TF), then triggering the coagulation system through binding to coagulation factor VIIa [10,11].

Interestingly, an autopsy study of the lungs in 10 COVID-19 patients revealed platelet-rich microvascular deposits in the small vessels of the lungs reminiscent of thrombotic microangiopathy [13].

Acute limb ischemia is an important consideration in patients with COVID-19 [ 14 ]. There have been more than a dozen case reports and case series of AMI (Acute Limb Ischemia) described in the literature [ [15] , [16] , [17] , [18] , [19] , [20], [21], [22], [23], [24], [25], [26], [27], [28], [29]. These patients often have multiple thromboses involving different vessels throughout their body. Many of these patients do not have existing peripheral arterial disease. Acute limb ischemia can even occur in patients already receiving thromboprophylaxis [22, 25, 27, 29].

Symptoms may include sharp pain in the limbs [15, 18, 20], focal hypothermia [15, 18, 22, 28], skin mottling [14, 15, 18, 23, 28], absent pulse [15, 15, 18, 23, 28]. 18, 22, 28], or toe necrosis [27]. Patients usually have elevated D-Dimer [19, 21, 25, 26, 28] and may also have elevated C-reactive protein (CRP) [18]. Although computed tomographic angiography (CTA) of the extremity is often performed, clinicians should consider adding CTA of the aorta to evaluate for concomitant aortic thrombosis [ 15 , 25 , 28 ]. Treatment involves vascular surgery and interventional radiology consultation, as well as empiric systemic anticoagulation [ 29 , 30 ]. A study of 20 patients found that surgical treatment was performed in 17 patients and successfully saved the limb in 12 (70.6%) [20]

### Conclusion:

Several internal and external factors make the treatment of acute ischemia more difficult during the COVID-19 pandemic. Diagnosis and management in COVID-19 patients may not be fully consistent with current guidelines. . COVID-19 is associated with a significant inflammatory response, increasing the risk of arterial and venous thrombosis. These complications can increase the risk of morbidity and mortality and include acute limb ischemia, abdominal and thoracic aortic thrombosis, mesenteric ischemia, myocardial infarction and acute coronary syndrome, venous thromboembolism, acute stroke and disseminated intravascular coagulation. Knowledge of these COVID-19-related conditions may improve emergency medicine clinicians' recognition and management of these thrombotic complications. Peripheral arterial thrombosis with or without AMI is a rare and unpredictable complication of COVID-19 infection requiring rapid and adequate management. Treatment is essentially based on curative anticoagulation associated or not with surgery despite the risk of re-thrombosis.

### Bibliography

1. The impact of the SARS-CoV-2 pandemic on the management of chronic limb-threatening ischemia and wound care
2. Revue des Maladies Respiratoires Actualités ; 14(1):125, 2022
3. Hoffmann M., Kleine-Weber H., Schroeder S. et al. L'entrée des cellules du SRAS-CoV-2 dépend de l'ACE2 et du TMPRSS2 et est bloquée par un inhibiteur de protéase cliniquement prouvé. *Cellule*. 2020 ; 181 (2) 271-280.e8
4. Santoso A., Pranata R., Wibowo A. et al. Les lésions cardiaques sont associées à la mortalité et à la pneumonie gravement malade dans le cadre du COVID-19 : une méta-analyse. *Suis J Emerg Med*. 2020 ; S0735-6757 (20) 30280-1
5. Santoso A., Pranata R., Wibowo A. et al. Les lésions cardiaques sont associées à la mortalité et à la pneumonie gravement malade dans le cadre du COVID-19 : une méta-analyse. *Suis J Emerg Med*. 2020 ; S0735-6757 (20) 30280-1
6. Fehr AR, Channappanavar R., Perlman S. Syndrome respiratoire du Moyen-Orient : émergence d'un coronavirus humain pathogène. *Ann Rév Med*. 2017 ; 68 : 387-399

7. Zhou P., Yang XL, Wang XG Une épidémie de pneumonie associée à un nouveau coronavirus probablement d'origine chauve-souris. *Nature*. 2020 ; 579 (7798) : 270-273
8. Ge XY, Li JL, Yang XL Isolement et caractérisation d'un coronavirus de type SRAS de chauve-souris qui utilise le récepteur ACE2. *Nature*. 2013 ; 503 : 535-538
9. Zhang H., Penninger JM, Li Y. et al. Enzyme de conversion de l'angiotensine 2 (ACE2) en tant que récepteur du SRAS-CoV-2 : mécanismes moléculaires et cible thérapeutique potentielle. *Soins intensifs Med*. 2020 ; 46 (4) : 586-590
10. Mackman N. Le rôle du facteur tissulaire et du facteur VIIa dans l'hémostase. *Anesth Analg*. 2009 ; 108 (5) : 1447-1452.
11. Branchford BR, Carpenter SL Le rôle de l'inflammation dans la thromboembolie veineuse. *Pédiatre avant*. 2018 ; 6 : 142.
12. Fox SE, Akmatbekov A., Harbert JL et al. Pathologie pulmonaire et cardiaque chez les patients afro-américains atteints de COVID-19 : une série d'autopsies de la Nouvelle-Orléans. *Lancet Respir Med*. 2020 ; 8 (7) : 681-686.
13. Fox SE, Akmatbekov A., Harbert JL et al. Pathologie pulmonaire et cardiaque chez les patients afro-américains atteints de COVID-19 : une série d'autopsies de la Nouvelle-Orléans. *Lancet Respir Med*. 2020 ; 8 (7) : 681-686
14. Gottlieb M., Long B. Manifestations dermatologiques et complications du COVID-19. *Suis J Emerg Med*. 6 juin 2020 doi : 10.1016/j.ajem.2020.06.011
15. Andrea V., Gianluca F., Rodolfo P., Paolo T., Alessandro P., Mauro G. Ischémie menaçante des membres inférieurs non annoncée chez un patient COVID-19 [publié en ligne avant impression, 21 mai 2020]
16. Rey JR, Caro-Codón J., Poveda Pineda D., et al. Complications thrombotiques artérielles chez les patients hospitalisés atteints de COVID-19 [publié en ligne avant impression, 23 mai 2020] *Rev Esp Cardiol (Engl Ed)* 2020 ; S1885-5857 (20) est ce que je : 10.1016/j.rec.2020.05.008. 30205-X.
17. Reyes Valdivia A., Gómez Olmos C., Ocaña Guaita J., Gandarias Zúñiga C. L'examen cardiovasculaire devrait également inclure une évaluation artérielle périphérique pour les patients atteints de COVID-19
18. Kaur P., Posimreddy S., Singh B. et al. COVID-19 se présentant comme une ischémie aiguë des membres. *Eur J Case Rep Intern Med*. 2020
19. Zhang Y., Xiao M., Zhang S. et al. Coagulopathie et anticorps antiphospholipides chez les patients atteints du Covid-19. *N Engl J Med*. 2020 ; 382 (17) est ce que je : 10.1056/NEJMc2007575. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
20. Kaur P., Qaqa F., Ramahi A. et al. Ischémie aiguë des membres supérieurs chez un patient atteint de COVID-19 [publié en ligne avant impression, 13 mai 2020] *Hematol Oncol Stem Cell Ther*. 2020 ; S1658-3876 (20) est ce que je : 10.1016/j.hemonc.2020.05.001. 30096-0. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
21. Bellosta R., Luzzani L., Natalini G. et al. Ischémie aiguë des membres chez les patients atteints de pneumonie COVID-19 [publié en ligne avant impression, 29 avril 2020] *J Vasc Surg*. 2020 ; S0741-5214 (20) est ce que je : 10.1016/j.jvs.2020.04.483. 31080-6. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
22. Griffin DO, Jensen A., Khan M. et coll. Complications thromboemboliques artérielles du COVID-19 chez les patients à

- faible risque malgré la prophylaxie [publié en ligne avant impression, 6 mai 2020] *Br J Haematol.* 2020 est ce que je : 10.1111/bjh.16792. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
23. Zhou B., She J., Wang Y., Ma X. Thrombose veineuse et artériosclérose oblitérante des membres inférieurs chez un patient très grave atteint du nouveau coronavirus 2019 : un rapport de cas. *J Thromb Thrombolys.* 2020 ; 50 (1):229-232. est ce que je: 10.1007/s11239-020-02084-w. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
  24. Mestres G., Puigmacià R., Blanco C., Yugueros X., Esturrica M., Riambau V. Risque de thrombose artérielle périphérique dans le COVID-19 [publié en ligne avant impression, 7 mai 2020] *J Vasc Surg .* 2020 ; S0741-5214 (20) est ce que je : 10.1016/j.jvs.2020.04.477. 31074-0. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
  25. Kashi M., Jacquin A., Dakhil B. et al. Thrombose artérielle sévère associée à une infection au Covid-19. *Thromb Rés.* 2020 ; 192 : 75-77. est ce que je: 10.1016/j.thromres.2020.05.025. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
  26. (26) Bétoule A., Martinet C., Gasperini G., et al. Diagnostic des événements thromboemboliques veineux et artériels chez les patients infectés par le virus COVID-19 [publié en ligne avant impression, 5 juin 2020] *J Thromb Thrombolysis.* 2020 : 1-3. est ce que je: 10.1007/s11239-020-02163-y. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
  27. Cantador E., Núñez A., Sobrino P. et al. Incidence et conséquences des événements thrombotiques artériels systémiques chez les patients atteints de COVID-19 [publié en ligne avant impression, 9 juin 2020] *J Thromb Thrombolysis.* 2020 : 1-5. est ce que je: 10.1007/s11239-020-02176-7. [ Article gratuit PMC ] [ PubMed ] [ CrossRef ] [ Google Scholar ]
  28. Singh G., Attique HB, Gadela NV, Mapara K., Manickaratnam S. Coagulation artérielle liée au COVID-19. *Curéus.* 2020 ; 12 (7) [ Article gratuit PMC ] [ PubMed ] [ Google Scholar ]
  29. Ilonzo N., Rao A., Safir S. et al. Manifestations thrombotiques aiguës de l'infection au COVID-19 : expérience dans un grand système de santé de la ville de New York
  30. Watson RA, Johnson DM, Dharia RN, Merli GJ, Doherty JU Thérapie anticoagulante et antiplaquettaire chez le patient COVID-19 : une initiative de qualité des meilleures pratiques dans un vaste système de santé [publié en ligne avant impression, juin 2020 9] *Pratique hospitalière.* 1995 ; 202



This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here:

**Submit Manuscript**

DOI:10.31579/2641-0419/343

#### Ready to submit your research? Choose Auctores and benefit from:

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

At Auctores, research is always in progress.

Learn more <https://auctoresonline.org/journals/clinical-cardiology-and-cardiovascular-interventions>